NON-PUBLIC?: N
ACCESSION #: 9009250140
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Turkey Point Unit 4 PAGE: 1 OF 5

DOCKET NUMBER: 05000251

TITLE: Automatic Reactor Trip on Low-Low Steam Generator Level Due to Loss of 4A Steam Generator Feedwater Pump
EVENT DATE: 08/12/90 LER #: 90-008-00 REPORT DATE: 09/10/90

OTHER FACILITIES INVOLVED: N/A DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: David R. Powell, Licensing TELEPHONE: (305) 246-6559
Superintendent

COMPONENT FAILURE DESCRIPTION:
CAUSE: X SYSTEM: SD COMPONENT: MO MANUFACTURER: A185
REPORTABLE NPRDS: Y

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT:

At 1625, on August 12, 1990, with Unit 4 in Mode 1 at 100 percent power, the 4B condensate pump motor automatically tripped on overcurrent. The 4A condensate pump automatically started as designed. The 4A steam generator feedwater pump tripped unexpectedly and initiated a turbine runback. The turbine runback and the reduced feedwater flow caused the steam generator levels to decrease. Operator actions were taken in an attempt to restore steam generator water levels. At 1628, a two-out-of-three Steam Generator A low-low level trip signal initiated an automatic reactor trip and subsequent automatic turbine trip. The unit was stabilized in Mode 3 (Hot Standby) using existing site procedures. The 4B condensate pump motor trip was caused by a phase-to-phase short. FPL postulates that a weak spot in the insulation was created when the motor was rewound in 1980. The weak spot degraded to the point that moisture could penetrate the insulation. The moisture provided an electrical short across the coils. The unexpected 4A steam generator feedwater pump (SGFP) trip was caused by an incorrect setpoint on an Agastat time delay breaker trip relay. The 4A and 4B SGFP breaker trip relays have been recalibrated. The condensate pump is being repaired.

END OF ABSTRACT

DESCRIPTION OF THE EVENT

At 1625, on August 12, 1990, with Unit 4 in Mode 1 at 100 percent power, the 4B condensate pump motor (EIIS:SD, Component:MO) automatically tripped on overcurrent. The 4A condensate pump automatically started as

designed. The 4A steam generator feedwater pump (SGFP) (EIIS:SJ, Component:P) subsequently tripped unexpectedly. The SGFP trip logic initiated a turbine runback. The turbine runback and the reduced feedwater flow caused the steam generator levels to decrease. Operator actions were taken in an attempt to restore the steam generator water levels.

At 1628, a two-out-of-three Steam Generator A low-low level trip signal initiated an automatic reactor trip and subsequent automatic turbine trip. Emergency Operating Procedures (EOPs) were entered. At approximately 1640, transition was made from EOPs to General Operating Procedure 4-GOP-103, "Power operation to Hot Standby." Unit 4 was stabilized in Mode 3 (Hot Standby).

At 1744, FPL notified the NRC Operations Center of a significant event in accordance with 10CFR50.72(b)(2)(ii) as an automatic actuation of a Reactor Protection Signal (RPS).

CAUSE OF THE EVENT

A. Upon failure of the 4B condensate pump motor, a small amount of water was observed to be coming from the bottom of the motor. Initially, the source of the water was believed to be a Turbine Plant Cooling Water (TPCW) leak in the motor upper bearing cooling coil. The first item checked after the motor failure was the upper and lower bearing oil levels. Both levels were found to be normal. A TPCW leak would have caused water to mix with the oil and resulted in an elevated oil level. However, a sample of water found in the area of the motor heater was analyzed and found to be plain water, not TPCW.

While disassembling the motor for shipment, no evidence of water was found under the filter housing and the air filter was found to be dry. However, a severe thunderstorm ended shortly before the motor failure. FPL believes the source of the water observed coming from the motor was rain water.

The 4B condensate pump motor was removed and sent to a FPL qualified motor rewind facility for inspection and repair. The motor upper bearing cooling coil was hydrostatically tested and no leaks were found. During inspection, a phase-to-phase short was discovered in the motor windings. FPL postulates that a weak spot in the insulation between the two phases was created when the motor was rewound in 1980. Movement of the coils during each start of the motor over the years may have caused the weak spot to degrade to the point that moisture could penetrate the insulation. The moisture ingress provided an electrical short across the coils. inspections during routine overhaul of the 4B condensate pump motor in 1988 did not reveal any abnormalities.

B. The 4A SGFP was initially thought to have tripped on low suction pressure. A low suction pressure condition sensed by two pressure switches will close contacts in an electrical circuit which energizes a time delay pickup relay (162 TDPU) to trip the SGFP breaker. The same relay is energized to trip the SGFP breaker when two condensate pump breakers are sensed to be open. The relay was found to be set at 0.15 seconds. This setting does not allow enough time for the start of a standby condensate pump to be sensed by the

SGFP breaker trip logic and thereby prevent tripping of the SGFP.

The original 4A SGFP breaker relay was a 2412PC Agastat relay (operational range between 0.8 and 15.0 seconds). The Amerace Corporation stopped manufacturing this relay in 1972 and designated the 7012PC Agastat relay (operational range between 1.5 and 15.0 seconds) as the correct replacement unit.

After an earlier failure of the relay, the outdated 2412PC Agastat relay was replaced with a 7012PC Agastat relay. The Plant Work Order (PWO) for change out and calibration of this relay is believed to have been worked prior to 1982 but cannot be located. Furthermore, no PWO can be located which required subsequent calibration of the relay. The cause for the relay being set below its operational range cannot be determined. However, absence of a relay setpoint being specified on the Elementary Wiring Diagram (EWD) for the 4A SGFP breaker may have been a contributing factor.

ANALYSIS OF THE EVENT

Operator actions in response to the low steam generator levels and the subsequent reactor trip were in accordance with approved plant procedures and resulted in a safe shutdown of the unit to Mode 3 (Hot Standby).

The Reactor Coolant System thermal transient experienced during this event has been determined to be similar to the design basis reactor trip from full power event. Safety systems functioned as designed during the event. No manual or automatic initiation of the Safety Injection System

occurred or was required. The Emergency Diesel Generators were not required to start.

The SGFP breaker is designed to trip after a timed delay upon sensing no condensate pump breakers closed or a low SGFP suction pressure condition. This circuit provides redundant means of protecting the SGFP. A relay setting of 2.0 seconds allows enough time for the automatic start of the standby condensate pump to be sensed by the SGFP breaker logic and prevent tripping of the SGFP. The SGFP vendor suggests a timed delay setting between 5.0 and 10.0 seconds but not to exceed 50.0 to 60.0 seconds. The 4A SGFP tripped 0.15 seconds after sensing no condensate pump breakers closed. The SGFP was protected from damage due to a potential low suction pressure condition.

CORRECTIVE ACTIONS

1. The 4B condensate pump motor will be repaired and reinstalled for use by September 17, 1990.

2. The design documents (i.e., Logic Diagram and EWDs) for the 3A, 4A and 3B/4B SGFP breakers have been revised to reflect a 7012PC Agastat relay setpoint of 5.0 0.5 seconds. This value is based upon FPL Engineering and SGFP vendor recommendations.

3. The 7012PC Agastat relays for the 4A and 4B SGFP breakers have been calibrated to 5.0 0.5 seconds.

4. The 7012PC Agastat relays for the 3A and 3B SGFPs were found to be

set at approximately 7.0 seconds and 3.5 seconds, respectively, based on relay dial settings. Although acceptable for operation, the relays will be recalibrated to reflect the new setpoint during the next unit outage of sufficient duration.

5. An action plan is being developed to identify the setpoints for Agastat time delay relays in use at Turkey Point Units 3 and 4 that do not have setpoints specified on design documents. This action plan will be finalized by November 2, 1990.

ADDITIONAL INFORMATION

Automatic reactor trips have been reported in Licensee Event Reports (LERs) 50-250/90-013, 50-250/90-011, 50-250/89-020, 50- 250/89-004, and 50-251/90-003. However, these LERs do not share the same root cause as this event.

The 4B condensate pump motor is a Louis Allis, Model WPX, vertically mounted, continuous duty, squirrel cage motor.

ATTACHMENT 1 TO 9009250140 PAGE 1 OF 1

P. O. Box 14000, Juno Beach, FL 33408-0420
FPL

SEP 10 1990

L-90-321
10 CFR 50.73

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555

Gentlemen:

Re: Turkey Point Unit 4
Docket No. 50-251
Reportable Event: 90-008
Date of Event: August 12, 1990
Automatic Reactor Trip on Low-Low Steam Generator Level
Due to Loss of the 4A Steam Generator Feedwater Pump

The attached Licensee Event Report is being provided pursuant to the requirements of 10CFR50.73 as notification of the subject event.

Very truly yours,

K. N. Harris
Vice President
Turkey Point Nuclear Plant

KNH/DRP/dwh

Attachment

cc: Stewart D. Ebneter, Regional Administrator, Region II, USNRC
Senior Resident Inspector, USNRC, Turkey Point Plant

*** END OF DOCUMENT ***